NOTES ON A CASE OF AMNESIA.

BY J. W. BATTERHAM, M.B. (LOND.), F.R.C.S.

THE subject of these remarks is a lady aged 60. Three years ago, after the death of her son, she had an attack of right hemiplegia, from which she recovered in a few weeks. Since that attack she has suffered from diabetes, and sugar is still present in her urine, whenever she abandons her usual (moderately restricted) dietary.

In January of the present year (1887) a recurrence of the hemiplegia was feared, as the patient suffered for three or four days from insomnia, violent pain in the head, giddiness and marked confusion of her mental faculties. After free purgation these symptoms passed away, leaving the patient in her present amnesic condition.

She now (April 1887) feels in good health, is cheerful, and takes walking and carriage exercise. Her appetite is good, tongue clean but rather dry, bowels costive. The urine has a sp. gr. of 1020 and is free from albumen and sugar.

The functions of the cranial nerves are normal. There is no apparent loss of sensation or any paralysis of the limbs, except, perhaps, a slight tendency "to bear to the right" when patient is walking out of doors.

The patient can hear perfectly. Her friends think that her hearing is even more acute than formerly. She understands everything that is said to her, and can converse readily, though often "at a loss" for a name (proper or common), for which she either unconsciously substitutes another, or intentionally uses a periphrasis.

She can repeat from memory words learned long ago, and can correctly describe long past events, but her memory for occurrences of recent date is greatly impaired, so that she often cannot recollect what she did a few days ago, or even what she ate at her last meal.

She can repeat readily whatever is said to her. Her sight is good. She can, with glasses, distinguish and count small dots on a sheet of paper when they are placed about a centimetre apart. She cannot, however, read written or printed characters, and is unable to name the letters of the alphabet when they are

pointed out to her without making numerous mistakes, but if asked to point out letters named to her, her blunders are much less frequent.

Numerals are recognised singly and in combination. The date of the year was at once pronounced by her, on seeing it written. She recognises common objects, but has more difficulty in naming them when they are presented to her for that purpose than she has in recalling the names she uses in ordinary conversation. On being shown a *doll*, and asked to name it, she called it "*a book*," and when told that she was wrong, guessed "*album*," "*dictionary*," &c. Asked if it were a baby, she shook her head, but readily assented when the word "*doll*" was suggested to her, saying, "of course, it is a doll." In no case was the patient able to *write* the name of an object, though unable to *utter* it.

Recognition of objects is facilitated by allowing patient to handle, smell, or taste them.

She writes well, either from dictation or spontaneously. A letter of four pages, written to an absent daughter, was perfectly intelligible, except that the word "*chain*" had been substituted for some other substantive of dissimilar meaning. Patient had also addressed the daughter and grand-daughter, to whom she was writing, by the names of the daughter and grand-daughter (respectively) with whom she was living. *She cannot, however, read aloud a word of what she has just written, nor is the writing intelligible to herself.* By the time she has arrived at the end of her letter she has forgotten the beginning. If interrupted in her writing, what she has already written must be read to her before she can resume the thread of her narrative.

She copies print or writing, but without knowing the meaning of what she writes. She has great difficulty in transliteration from printed to written characters, or vice versâ.

Occasionally, after copying a short word she will spell it over aloud and pronounce correctly, understanding its meaning; but cannot always manage this. When asked to copy the words, "*OUR*," "*SISTERS*," "*KATE*," she did so *correctly* in legible printed characters, but more as if she were *drawing*, i.e. she did not form the different portions of the individual letters in the same order as a person generally does, and began one letter before she had finished the preceding, returning to the unfinished one afterwards to put in the "*finishing touches*." On being asked to spell what she had copied, she pronounced the first word O, U, T, and the last Z, A, T, E. She also miscalled the S in "*sisters*." In short she miscalled three of the four consonants before her, but repeated the five vowels correctly. Tested with different words a few days afterwards, she still remembered

the vowels, but made several mistakes with the consonants. Though the act of copying *printed* characters seemed to render the patient but little assistance in her recognition of them, the contrary held good with regard to *written* symbols. When asked to spell out a word written in the "round-hand" of the copy-books, she failed with several letters; but on being told to copy the unrecognised signs, or to run her pencil over them *as if writing them*, she in most cases recognised their name and significance. This experiment was repeated several times, and the patient was delighted to find that she could "jog her memory" of letters in this way.

The recognition of those printed letters, *the form of which was closely allied to that of the corresponding written symbol usually employed by her*, was also facilitated by this device.

The condition of this patient is of some interest, when considered with reference to the current views of the cerebral mechanism by means of which written and spoken language is appreciated, and by means of which we are enabled to express our thoughts in spoken and written words.

The theory by which the foregoing case seems best explained is that held by Dr. Charlton Bastian,¹ which agrees in many points with that enunciated by Prof. Kussmaul in 'Ziemssen's Cyclopædia,' vol. iv

It supposes the presence in the cerebral cortex of—

(1.) A centre for the perception of the *sounds* of spoken words—the auditory word-centre.

(2.) A centre for the perception of the forms of written or printed words—the visual word-centre.

These two "word-centres" are probably parts of the perceptive centres for Hearing and Sight, localised by Ferrier in the upper half of the superior temporo-sphenoidal convolution, and in the angular gyrus and adjacent part of the supra-marginal lobule respectively.

Whenever there is present in our consciousness the sound or the visual symbol of a word, it is due to the activity of one of these centres. This activity may be excited by afferent impulses from the organs of hearing and sight, respectively; *e.g.*, the sound or sight of a familiar name excites in our mind the idea of the corresponding object; and conversely, when a known object is presented to us through the medium of our ears or eyes, its name, uttered and written, arises more or less vividly in our consciousness.

These centres may also respond to stimuli originating in the activity of other areas of cerebral structure, as when we voluntarily or involuntarily recall the sound or form of a word (associational or volitional stimuli)

¹ 'The Brain as an Organ of Mind,' pp. 601, 618.

This power of response to stimulation from an associated centre is also illustrated by the facility with which the idea of a sound is excited by the sight of its written or printed symbol, while, on the other hand, a spoken word, though directly stimulating the auditory word-centres, elicits in the visual word-centres the image of its form. This indicates a close union between the auditory or visual centres for the perception of words by fibres allowing the passage of impulses in either direction, so that each centre is capable of receiving stimuli from, or sending them to, the other.

In the expression of our thoughts in speech or writing, the action of the auditory and visual word-centres calls into activity the motor-regulating or kinæsthetic centres, by the aid of which the movements of the vocal organs in speech, and the hand in writing, are governed and co-ordinated.

The kinæsthetic centre for speech movements is, as might be supposed, more closely connected with the auditory word-centre, that for writing movements with the visual word-centre. [The kinæsthetic speech centre *may*, however, as a result of special education, be stimulated directly from the visual centre, as when deaf-mutes are taught to speak; and, similarly, the centres for writing may be stimulated from the auditory centre, as in the case of persons born blind.]

To sum up, we are possessed of an auditory perceptive word-centre capable of receiving at least three kinds of stimuli to action, viz.,

1. Volitional;
2. From ear;
3. From visual word-centre;

and capable of originating stimuli which may proceed :

1. To visual word-centre;
2. To kinæsthetic centre for speech movements.
- [3. " " writing movements.]

We have also a visual perceptive word-centre capable of response to at least three kinds of stimuli, viz.,

1. Volitional;
2. From eye,
3. From auditory word-centre;

And which can originate stimuli proceeding to,

1. The auditory word-centre.
2. The kinæsthetic centre for writing.
- [3. " " " speech.]

To apply this theory to the case before us, first let us test the *auditory word-centre*.

The patient speaks spontaneously, but often forgets or misuses names. The reaction of this centre to volitional

stimuli is therefore slightly impaired, and the patient suffers from paralytic and inco-ordinate amnesia to a slight extent.

She understands perfectly what she hears. Reaction to stimuli from ear is therefore normal.

She can repeat correctly what is said to her. The relations of the auditory word-centre with the kinæsthetic centre for speech-movements are thus seen to be unimpaired.

On testing the *visual word-centre* we find that the patient can spontaneously express herself in writing, but that her written language is subject to the same slight defects as her spoken language.

Though her sight is good, written and printed matters are unintelligible to her. She is only able to recognise a letter here and there, and, with assistance, to spell out a short word. This want of reaction in the visual word-centre to stimuli from the organ of sight is further exemplified by the great difficulty which the patient experiences in naming objects presented to her view, though she is perfectly aware of their nature, and will immediately acquiesce when the right name is proposed to her.

The fact that, on handling, tasting, or smelling the objects shown her, she will often recollect their names though unable to do so on merely seeing them, illustrates the possibility of stimulating the auditory word-centre through the tactile, olfactory or gustatory perceptive centres.

That the patient can write, both spontaneously and from copy, shows that the connections of the visual word-centre with the kinæsthetic centre for hand movements are unimpaired.

Let us now turn our attention to the *commissural fibres*, connecting the auditory and visual word-centres, which are employed when one centre is called into action by stimuli directed to the other. When words are repeated to the patient she can write them down correctly. The visual centre is therefore capable of stimulation through the auditory or, in other words, the *audito-visual fibres* of the commissure are intact.

When words are written down and shown to her, or when a printed book is put before her, the patient cannot read aloud. Were her visual word-centre shown to be normal, this inability to read aloud would indicate a lesion of the visuo-auditory commissural fibres. Since her visual word-centre has been shown to be damaged, it is not improbable that the '*block*' is situated in that centre and not in the commissural fibres. It seems, therefore, that a lesion of the visuo-auditory fibres in this case is, though not incompatible with our theory, yet

hardly required by it, and, if existent, is difficult of demonstration.

It is interesting to notice the assistance afforded to the patient, in her efforts to read, by the act of passing her pencil over the letters, *as if writing them*. This phenomenon has been noticed by Dr. Bastian,¹ who quotes a case recorded by Westphal, in which it was clearly marked. "Apparently the kinæsthetic impressions" [*i.e.* impressions of "muscular sense" or "sense of motion"] "were capable of rousing related parts of the auditory word-centre"—the nervous impulses being assumed to have passed *directly* from the kinæsthetic centre for writing to the auditory word-centre or *indirectly* to it *viâ* the more closely related visual word-centre.

The recognition of *numerals*, while letters are unintelligible, has often been noticed in cases of this kind. Dr. Bastian² accounts for it by the supposition that, the individual numerals being only nine in number while the letters are twenty-six, the amount of individual attention directed to the former must have been greater, and that the patient is therefore more familiar with them. It may be urged, however, that, unless a man has been constantly engaged in pursuits which necessitate the frequent use of numerals, he will during his lifetime have devoted a much larger amount of attention to letters, since one may read or write many pages without the aid of a single numeral, while one rarely sees a page of numerals without a single letter.

I do not know of any other case in which, as in the present, it has been noticed that the vowels were better recognised than the consonants.

Note on Patient's condition, June 1887.—She is in good general health. Her memory has much improved. She can read a few lines of a printed book, but is tired by the effort, and soon becomes unable to recognise the words. Her style of reading is like that of a schoolboy translating "at sight." She goes on swimmingly for several words, then hesitates and guesses the meaning of the next word from the context. She will thus read "man" for "person," "godly" for "righteous," &c.

¹ 'The Brain as an Organ of Mind,' p. 646, note.

² *Loc. cit.* p. 664.